

REMARKS/ARGUMENTS

Claims 1, 2 and 6-20 have been cancelled. Claims 21- 38 have been added.

Declaration Under 35 CFR §1.131

In the Office Action of January 29, 2004, the Examiner has noted an inconsistency between the declaration under 37 CFR §1.131 stating a publication date March 2001 and the Information Disclosure Statement (IDS) stating a publication date of March 2000 of the Bush et al (SPIE) article. A corrected IDS is submitted herewith stating a publication date of March 2001 of the Bush et al (SPIE) article. Applicant agrees with the Examiner in that the March 2001 publication date makes the article available under 35 USC §102(a) which Applicant respectfully submits is overcome by the previously submitted declaration under 37 CFR §1.131 and thereby removes the article as prior art.

REJECTIONS UNDER 35 USC §102(b)

In the Office Action of January 29, 2004, the Examiner has rejected claims 1, 2 and 6-20 under 35 USC §102(b) as being clearly anticipated by Bush et al (SPIE). With the corrected IDS, along with the previously submitted declaration under 37 CFR §1.131 and a new declaration under 37 CFR §1.132, Applicant respectfully submits that the Bush et al (SPIE) article is removed as a prior art reference.

REJECTIONS UNDER 35 USC §103(a)

The Examiner has rejected claims 10, 11, 15 and 16 under 35 USC §103(a) as being unpatentable over US Patent No. 5,633,712 to Venkatesh et al. (hereinafter "*Venkatesh*") in view of US Patent No. 5,867,268 to Gelikonov et al. (hereinafter "*Gelikonov*"). In addition, claims 18, and 19 are rejected under 35 USC §103(a) as being unpatentable over *Venkatesh* and *Gelikonov* as applied to claims 10, 11, 15 and 16 above, and further in view of US Patent No. 6,104,215 to Kempen et al. (hereinafter "*Kempen*"). Also, claims

13, 14 and 17 are rejected under 35 USC §103(a) as being unpatenable over *Venkatesh* and *Gelikonov* as applied to claims 10, 11, 15, and 16 above and further in view of US Patent No. 5, 206, 924 to Kersey (hereinafter "*Kersey*"). The Examiner has rejected claim 20 under 35 USC §103(a) as being unpatenable over *Venkatesh*, *Gelikonov* and *Kersey* as applied to claims 10, 11 and 13-17 above, and further in view of *Kempen*. Also, claim 12 is rejected under 35 USC §103(a) as being unpatenable over *Venkatesh* and *Gelikonov* as applied to claims 10, 11, 15, and 16 above and further in view of the prior art of Applicant's figure 1. Claims 1 and 2 are rejected under 35 USC §103(a) as being unpatenable over *Venkatesh* and *Gelinkonov* and *Kersey*. Claims 6-9 are rejected under 35 USC §103(a) as being unpatenable over *Venkatesh*, *Gelinkonov* and *Kersey* as applied to claims 1 and 2 and further in view of *Kempen*.

NEW CLAIMS

Claims 21-38 have been added. The present autocorrelator apparatus, in its several claimed embodiments, has a broadband light source, lengths of single mode fiber, at least one arm having a piezoelectric fiber stretcher and a Faraday rotator mirror.

The replacing of a beam-splitter of the bulk optic autocorrelator of *Venkatesh* with an all-fiber coupler in order to achieve a fiber optic Michelson interferometer is well known to the skilled artisan. However, the use of piezoelectric fiber stretchers in Michelson reflectometers causes a very large birefringence modulation. That is, the use of single mode fiber with the use of a piezoelectric fiber stretcher renders single mode fiber Michelson reflectometer designs useless due to coherence broadening. Although more costly and difficult to work than single mode fiber, a known remedy for single mode fiber Michelson reflectometer having a broadband light source is the use of polarization-maintaining fiber, i.e., the "anisotropic fiber" of *Gelikonov*. However, if such an apparatus is to be limited to coherent light, ostensibly from a narrow linewidth optical source, and the light beam not subject to the modulated phase and polarization induced by a modulated piezoelectric fiber stretcher, the use of Faraday rotator mirrors with single mode fiber may be contemplated, *arguendo*, as in *Kersey*. However, the anticipated

restorative effects of Faraday rotator mirrors as applied in *Kersey* are neither shown nor suggested in the cited art to be achievable over a range in wavelengths and it is neither shown nor suggested in the cited art that the application Faraday rotator mirrors is restoratively effective in the face of a relatively rapid modulation in phase and polarization of the light beam originating from a coherent or broadband light source light.

In the Office Action of January 29, 2004, the Examiner has stated on page 12 the following:

“With regards to applicant’s arguments with respect to *Kersey*; applicant argues that *Kersey* uses the Faraday-rotator mirrors for polarization fading in a coherent system while applicant is concerned with broadening. Both coherence broadening and polarization fading are caused by the same problem of birefringence in long optical fibers. As the use of a Faraday-rotator mirror is the solution to polarization fading due to the effects of fiber birefringence, the skilled artisan would have been motivated to solve the similar problem of coherence broadening by using a Faraday-rotator mirror.”

An important distinction made in the Applicant’s argument filed 27 October 2003, page 10, lines 22-23, is that

“*Kersey* teaches the use of FRMs for sensing applications using laser light sources and not broadband sources.”

Due to the wavelength dependence of the polarization rotation provided by a Faraday rotator mirror, it functions best to eliminate polarization fading of light at a single wavelength, as taught by *Kersey*. It is known in the field that the effectiveness of polarization fading is reduced for an additional light source having of a second wavelength substantially different from the first, i.e., the wavelength to which the Faraday rotator mirror is optimized and is further degraded with the application of

broadband light. The Applicant respectfully submits that because *Kersey* discloses exclusively coherent light sources, the degradation of a Faraday rotator mirror in eliminating polarization fading of a light beam having several wavelengths does not arise.

While the Examiner has stated presumably for single mode fiber that “the use of a Faraday-rotator mirror is the solution to polarization fading due to the effects of fiber birefringence,” as though the application of a Faraday-rotator mirror would be obvious to try by the skilled artisan in order to produce the results of the present invention. However, the Applicant respectfully submits that a Faraday rotator mirror is counter indicated to one of ordinary skill in the art when a broadband light source is used and where the broadband light beam from that source has relatively rapid phase modulation and polarization induced by a modulated piezoelectric fiber stretcher acting on single mode fiber. The Applicant respectfully submits that to extend the above-cited Examiner’s statement to the present invention as claimed would be inappropriate in that one of ordinary skill in the art recognizes the challenging nature of the example autocorrelator. That is, the using a broadband light source and the broadband light beam from that source having a relatively rapid phase modulation and polarization induced by a modulated piezoelectric fiber stretcher acting on single mode fiber in a delay line, does not establish a situation where it becomes obvious to the skilled artisan to try a Faraday-rotator mirror in the manner claimed in the present invention. (Please see the enclosed second Declaration under 37 CFR §1.132.) Of course, even if it were obvious to try a Faraday-rotator mirror, this is not the test for obviousness. See *In re Deuel*, 34 USPQ 2d 1210, 1216 (Fed. Cir. 1995).

The present application satisfies a long-felt need in the industry for a cost effective solution to the PM Michelson interferometer. For example, a licensee of *Gelikonov* has funded Optiphase, Inc., the assignee of the present application, to demonstrate compatibility of the all fiber autocorrelator to the probe assemblies of the licensee based on US Patent No. 6,608,684 also to Gelikonov et al. (Please see the enclosed second Declaration under 37 CFR §1.132.)

For the foregoing reasons, the Applicant respectfully submits that independent claims 21, 27, and 31 are patentable over the cited art and are in a condition for allowance and their respective dependent claims 22-26, 28-30 and 32-38 merely add further clarification or limitation to the invention as claimed and are therefore patentable over the cited art and are in a condition for allowance.

Conclusion

In view of the above amendments and remarks, consideration and favorable action on claims 21-38 are respectfully requested. Accordingly, Applicant respectfully requests that a timely Notice of Allowance be issued in this case. Should any question remain in view of his communication, the Examiner is encouraged to call the undersigned so that a prompt disposition of this application can be achieved.

By this Amendment, the present application has three independent claims and a total of eighteen claims. The Request for Continued Examination fee is \$385.00. Should there be any additional fees for this action, your office is authorized to draw from the firm deposit account number 02-3979. Should any question remain in view of this communication, I would appreciate a telephone call so that this matter may be resolved promptly.

Respectfully submitted,
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